

Claims

What is claimed is:

1. A system for converting a synchronous method call on a target method to an asynchronous method call, the system comprising:
 - a pattern generator operable to break the synchronous method call into one or more constituent parts; and
 - a pattern data store, operably connected to the pattern generator, the pattern data store adapted to store data associated with converting a synchronous method call to an asynchronous method call.
2. The system of claim 1, where the one or more constituent parts comprise at least one of:
 - a begin asynchronous operation method;
 - an end asynchronous operation method;
 - an asynchronous call state object; and
 - an asynchronous call result object.
3. The system of claim 2, where the begin asynchronous operation method accepts as inputs at least one of:
 - input parameters presented to the target method;
 - input/output parameters presented to the target method;
 - parameters passed by reference to the target method;
 - the address of an asynchronous callback routine; and
 - the asynchronous call state object.
4. The system of claim 3, where the begin asynchronous operation method returns the asynchronous result object.

5. The system of claim 4, where the end asynchronous operation method accepts as inputs at least one of:
 - input/output parameters presented to the target method;
 - output parameters presented to the target method;
 - parameters passed by reference to the target method; and
 - the asynchronous call result object.
6. The system of claim 5, where the asynchronous call result object comprises:
 - a first field that holds information concerning whether the begin asynchronous operation completed asynchronously; and
 - a second field that holds information concerning whether a server completed processing the target method.
7. The system of claim 6, where the asynchronous call result object provides a waitable object.
8. The system of claim 7, where the asynchronous call result object implements an interface, the interface comprising at least one of:
 - an asynchronous call state object get method;
 - a wait handler object get method;
 - a synchronous call completed field get method; and
 - a target method call completed field get method.
9. The system of claim 8, where the end asynchronous operation is invoked by one of:
 - an asynchronous call result poller;
 - the begin asynchronous operation method;
 - an asynchronous call result waiter; and
 - an asynchronous callback routine.

10. The system of claim 9 where the asynchronous call result poller is operable to poll the asynchronous call state object to determine whether the server has completed processing the target method.
11. The system of claim 9 where the asynchronous call result waiter is operable to periodically sleep and wakeup, where during an awakened period the asynchronous call result waiter is operable to determine whether the server has completed the target method by examining the asynchronous call result object.
12. The system of claim 9 where the asynchronous callback routine is invoked when the server has completed the target method.
13. The system of claim 2, where the pattern generator can convert method calls associated with at least one of file input/output, stream input/output, socket input/output, networking, remoting channels, proxies, web forms, web services and messaging message queues.
14. The system of claim 2, where the pattern generator can convert method calls associated with file input/output, stream input/output, socket input/output, networking, remoting channels, proxies, web forms, web services and messaging message queues.
15. A computer readable medium storing computer executable components of the system of claim 1.

16. A system to facilitate making asynchronous calls on a target method, the system comprising:

an asynchronous call initializer adapted to accept input parameters from a client caller and to forward the input parameters towards the target method, the asynchronous call initializer further adapted to establish a callback routine, where the callback routine can be invoked upon completion of the target method, the asynchronous call initializer further adapted to accept a state object and to populate one or more fields in the state object with state values associated with the asynchronous call, the asynchronous call initializer further adapted to return a result object to the client caller;

an asynchronous call completer adapted to accept results generated by the target method and to supply the results to the client caller, the asynchronous call completer further adapted to update the state object, the asynchronous call completer further adapted to update the result object; and

a state tracker, operable to track and log state related to processing associated with the asynchronous call initializer, the asynchronous call completer and the target method, the state tracker further operable to update the state object.

17. A computer readable medium storing computer executable components of the system of claim 16.
18. A method for converting code for a synchronous method call on a target method to code for an asynchronous method call, the method comprising:
- receiving a code for a synchronous method call;
 - passing the code for the synchronous method call through a call conversion process to produce a code for an asynchronous method call;
 - creating an asynchronous call result object to store results associated with the asynchronous method call; and
 - creating an asynchronous call state object to store state information associated with the asynchronous method call.

19. The method of claim 18, where the call conversion process comprises:
subdividing the code for the synchronous method call into constituent parts; and
creating one or more asynchronous method call code segments corresponding to the constituent parts.
20. The method of claim 19, where the constituent parts comprise at least one of:
a begin operation that will not block due to asynchronous method calling;
and
an end operation that will not block due to asynchronous method calling.
21. The method of claim 20, where the end operation is invoked by one of:
processing associated with polling a field in the asynchronous call state object;
processing associated with waiting on the asynchronous call result object;
the begin operation; and
an asynchronous callback routine.
22. The method of claim 21 where code for synchronous method calls associated with at least one of file input/output, stream input/output, socket input/output, networking, remoting channels, proxies, web forms, web services and messaging message queues can be converted.
23. The method of claim 21, where code for synchronous method calls associated with file input/output, stream input/output, socket input/output, networking, remoting channels, proxies, web forms, web services and messaging message queues can be converted.

24. A computer readable medium storing computer executable instructions for a method for converting code for a synchronous method call on a target method to code for an asynchronous method call, the method comprising:
- dividing the synchronous method call into at least one of a non-blocking asynchronous begin operation and a non-blocking asynchronous end operation; and
 - associating a call state object to at least one of the non-blocking asynchronous begin operation and the non-blocking asynchronous end operation.
25. A method for facilitating asynchronous method calls on a target method, the method comprising:
- receiving a request from a calling client to perform processing associated with beginning an asynchronous call to a target method;
 - initializing a state tracking object;
 - initializing a result object;
 - queuing a call to the target method, where the call is queued in a thread pool;
 - returning control and a result object to the calling client;
 - receiving a request from the calling client to perform processing associated with ending the asynchronous call to the target method; and
 - returning control and a result consistent with the result of the target method to the calling client upon completion of the processing associated with ending the asynchronous call to the target method.
26. The method of claim 25 where the request from the calling client to perform processing associated with ending the asynchronous call to the target method is controlled by one of a polling process and a waiting process.

27. A computer readable medium storing computer executable instructions operable to perform a method for facilitating asynchronous method calls to a target method, the method comprising:
- accepting one or more requests from a caller to begin an asynchronous call to a target method;
 - initializing at least one of a state tracking object and a result object;
 - queuing a call to the target method;
 - accepting one or more requests to end the asynchronous call to the target method; and
 - sending at least one of a result and a result object to the caller.
28. A method for facilitating asynchronous method calls to a target method, the method comprising:
- receiving a request from a calling client to perform processing associated with beginning an asynchronous call to a target method;
 - initializing a state tracking object;
 - establishing a callback routine, where the callback routine will be invoked upon notification of the completion of the target method, and where the callback routine will invoke processing associated with ending the asynchronous call to the target method;
 - queuing a call to the target method, where the call is queued in a thread pool;
 - returning control and a result object to the calling client;
 - invoking the callback routine upon receiving notification of the completion of the target method;
 - performing processing associated with ending the asynchronous call to the target method; and
 - returning control and a result consistent with the result of the target method to the calling client upon completion of the processing associated with asynchronous call of the target method.

29. A system for converting a synchronous method call to an asynchronous method call, the system comprising:
- means for accepting instructions to call a target method synchronously;
 - means for generating instructions to call the target method asynchronously;
 - means for generating an object to store results generated in response to performing the instructions to call the target method asynchronously; and
 - means for generating an object to store state information associated with performing the instructions to call the target method asynchronously.
30. A data packet adapted to be transmitted between two or more computer processes, the data packet comprising:
- a first field operable to store information identifying a target method called by a synchronous method call;
 - one or more second fields operable to store parameters intended for the target method;
 - a third field operable to store information concerning a callback routine to be invoked when the target method completes; and
 - one or more fourth fields operable to store parameters returned from the target method.